

FLIGHT SUMMARY REPORT

Flight Number: 99-074
Calendar/Julian Date: 21 May 1999 • 141
Sensor Package: Wild-Heerbrugg RC-10
Airborne Visible and Infrared
Imaging Spectrometer (AVIRIS)
Modis Airborne Simulator (MAS 50)
Area(s) Covered: Lake Okeechobee, FL
West Florida Shelf

Investigator(s): Carder, University of South Florida
Davis, NRL

Aircraft #: 809

SENSOR DATA

Accession #:	05344	-----	-----
Sensor ID #:	034	099	108
Sensor Type:	RC-10	AVIRIS	MAS 50
Focal Length:	12" 304.66 mm	-----	-----
Film Type:	Aerochrome IR SO-134	-----	-----
Filtration:	Wratten 12	-----	-----
Spectral Band:	510-900 nm	-----	-----
f Stop:	11	-----	-----
Shutter Speed:	1/250	-----	-----
# of Frames:	67	-----	-----
% Overlap:	60	-----	-----
Quality:	Excellent	-----	-----
Remarks:	Subtract 96 seconds for correct UTC		

Airborne Science and Applications Program

The Airborne Science Branch at NASA's Dryden Flight Research Center, Edwards, California, operates two ER-2 high altitude aircraft in support of NASA earth science research. The ER-2s are used as readily deployable high altitude sensor platforms to collect remote sensing and in situ data on earth resources, celestial phenomena, atmospheric dynamics, and oceanic processes. Additionally, these aircraft are used for electronic sensor research and development and satellite investigative support.

The ER-2s are flown from various deployment sites in support of scientific research sponsored by NASA and other federal, state, university, and industry investigators. Data are collected from deployment sites in Kansas, Texas, Virginia, Florida, and Alaska. Cooperative international scientific projects have deployed the aircraft to sites in Great Britain, Australia, Chile, and Norway.

Photographic and digital imaging sensors are flown aboard the ER-2s in support of research objectives defined by the sponsoring investigators. High resolution mapping cameras and digital multispectral imaging sensors are utilized in a variety of configurations in the ER-2s' four pressurized experiment compartments. The following provides a description of the digital multispectral sensor(s) and camera(s) used for data collection during this flight.

Airborne Visible and Infrared Imaging Spectrometer

The Airborne Visible and Infrared Imaging Spectrometer (AVIRIS) is the second in the series of imaging spectrometer instruments developed at the Jet Propulsion Laboratory (JPL) for earth remote sensing. This instrument uses scanning optics and four spectrometers to image a 614 pixel swath simultaneously in 224 contiguous spectral bands (0.4-2.4 μm).

AVIRIS parameters are as follows:

IFOV:	1 mrad
Ground Resolution:	66 feet (20 meters) at 65,000 feet
Total Scan Angle:	30°
Swath Width:	5.7 nmi (10.6 km) at 65,000 feet
Spectral Coverage:	0.41-2.45 μm
Pixels/Scan Line:	614
Number of Spectral Bands:	224
Digitization:	10-bits
Data Rate:	17 MBPS

<u>Spectrometer</u>	<u>Wavelength Range</u>	<u>Number of Bands</u>	<u>Sampling Interval</u>
1	0.41 - 0.70 μm	31	9.4 nm
2	0.68 - 1.27 μm	63	9.4 nm
3	1.25 - 1.86 μm	63	9.7 nm
4	1.84 - 2.45 μm	63	9.7 nm

All AVIRIS data is decommutated and archived at JPL and not currently available for public distribution. For further information contact Rob Green at Jet Propulsion Laboratory, 4800 Oak Grove Drive, Mail Stop 183-501, Pasadena, California 91109-8099.

MODIS Airborne Simulator

The MODIS Airborne Simulator (MAS) is a modified Daedalus multispectral scanner configured to replicate the capabilities of the Moderate-Resolution Imaging Spectrometer (MODIS), an instrument to be orbited on an EOS platform. MODIS is designed for the measurement of biological and physical processes and atmospheric temperature sounding. The MODIS Airborne Simulator records fifty 16-bit channels of multispectral data and is configured as follows:

Spectral Channel	Band center (μm)	Bandwidth (μm)	Spectral Range
1	0.4649	0.0397	0.4451-0.4848
2	0.5494	0.0417	0.5285-0.5703
3	0.6550	0.0511	0.6294-0.6805
4	0.7024	0.0415	0.6816-0.7231
5	0.7431	0.0420	0.7221-0.7641
6	0.8248	0.0427	0.8034-0.8461
7	0.8667	0.0414	0.8460-0.8874
8	0.9072	0.0409	0.8867-0.9276
9	0.9476	0.0397	0.9277-0.9674
10	1.6422	0.0519	1.6163-1.6682
11	1.6975	0.0505	1.6722-1.7228
12	1.7499	0.0506	1.7245-1.7752
13	1.8014	0.0491	1.7768-1.8259
14	1.8548	0.0489	1.8303-1.8792
15	1.9044	0.0487	1.8801-1.9288
16	1.9553	0.0483	1.9312-1.9794
17	2.0048	0.0487	1.9804-2.0291
18	2.0551	0.0484	2.0309-2.0793
19	2.1037	0.0486	2.0794-2.1280
20	2.1532	0.0483	2.1291-2.1774
21	2.2019	0.0481	2.1779-2.2259
22	2.2522	0.0486	2.2278-2.2675
23	2.3021	0.0487	2.2777-2.3265
24	2.3512	0.0476	2.3274-2.3750
25	2.4005	0.0483	2.3764-2.4246

Spectral Channel	Band center (μm)	Bandwidth (μm)	Spectral Range
26	3.1192	0.1616	3.0384-3.2000
27	3.2809	0.1486	3.2066-3.3552
28	3.4330	0.1617	3.3521-3.5138
29	3.5940	0.1539	3.5170-3.6709
30	3.7449	0.1449	3.6724-3.8174
31	3.9069	0.1602	3.8267-3.9870
32	4.0707	0.1554	3.9929-4.1484
33	4.1699	0.0669	4.1365-4.2034
34	4.4029	0.1255	4.3401-4.4656
35	4.5404	0.1512	4.4648-4.6160
36	4.6979	0.1591	4.6184-4.7775
37	4.8536	0.1516	4.7778-4.9294
38	5.0033	0.1468	4.9298-5.0767
39	5.1588	0.1400	5.0888-5.2288
40	5.3075	0.1327	5.2412-5.3738
41	5.3977	0.0755	5.3590-5.4365
42	8.5366	0.3950	8.3391-8.7341
43	9.7224	0.5365	9.4541-9.9906
44	10.5071	0.4579	10.278-10.736
45	11.0119	0.4710	10.776-11.247
46	11.9863	0.4196	11.776-12.196
47	12.9013	0.3763	12.713-13.089
48	13.2702	0.4584	13.041-13.500
49	13.8075	0.5347	13.540-14.075
50	14.2395	0.3775	14.051-14.428

NOTE: Bandpass centers approximate

Sensor/Aircraft Parameters:

Spectral Bands: 50 (digitized to 16-bit resolution)
IFOV: 2.5 mrad
Ground Resolution: 163 feet (50 meter at 65,000 feet)
Swath Width: 22.9 nmi/19.9 nmi (36 km)
Total Scan Angle: 85.92°
Pixels/Scan Line: 716
Scan Rate: 6.25 scans/second
Ground Speed: 400 kts (206 m/second)
Roll Correction: Plus or minus 3.5 degrees (approx.)

Camera Systems

Various camera systems and films are used for photographic data collection. Film types include high definition color infrared, natural color, and black and white emulsions. Available photographic systems are as follows:

- Wild-Heerbrugg RC-10 metric mapping camera
 - 9 x 9 inch film format
 - 6 inch focal length lens provides area coverage of 16 x 16 nautical miles from 65,000 feet
 - 12 inch focal length lens provides area coverage of 8 x 8 nautical miles from 65,000 feet
- Hycon HR-732 large scale mapping camera
 - 9 x 18 inch film format
 - 24 inch focal length lens provides area coverage of 4 x 8 nautical miles from 65,000 feet
- IRIS II Panoramic camera
 - 4.5 x 34.7 inch film format
 - 24 inch focal length lens
 - 90 degree field of view provides area coverage of 2 x 21.4 nautical miles from 65,000 feet

The U.S. Geological Survey's EROS Data Center at Sioux Falls, South Dakota serves as the archive and product distribution facility for NASA-Ames aircraft acquired photographic and digital imagery. For information regarding photography and digital data (including areas of coverage, products, and product costs) contact EROS Data Center, Customer Services, Sioux Falls, South Dakota 57198 (Telephone: 605-594-6151).

Additional information regarding ER-2 acquired photographic and digital data is available through the Airborne Sensor Facility at Ames Research Center. For specific information regarding flight documentation, sensor parameters, and areas of coverage contact the Airborne Sensor Facility, NASA-Ames Research Center, Mail Stop 240-6, Moffett Field, California 94035-1000 (Telephone: 650-604-6252).

MODIS AIRBORNE SIMULATOR (MAS) FLIGHT LINE INFORMATION FOR 21-MAY-1999 FLIGHT 99-074

START OF FLIGHT LINE							END OF FLIGHT LINE					
LINE	TIME HH:MM:SS	LAT DEG	LON DEG	SOLAR ZEN AZIM		START HEADING	TIME HH:MM:SS	LAT DEG	LON DEG	SOLAR ZEN AZIM		SCAN LINES
1	13:26:30	27.820	-79.690	52.4	85.1	154.43	13:28:36	27.612	-79.562	51.9	85.2	790
2	13:29:49	27.483	-79.570	51.6	85.3	215.78	13:32:12	27.263	-79.739	51.2	85.3	896
3	13:33:00	27.188	-79.795	51.1	85.3	215.29	13:36:29	26.863	-80.042	50.6	85.3	1301
4	13:37:34	26.807	-80.156	50.4	85.4	272.08	13:46:04	26.817	-81.245	49.4	85.8	3173
5	13:53:25	26.993	-81.602	48.1	86.3	90.24	14:02:37	26.984	-80.492	45.1	87.7	3436
6	14:08:45	26.893	-80.268	43.5	88.6	275.07	14:16:17	26.903	-81.243	42.7	89.0	2814
7	14:17:10	26.934	-81.347	42.5	89.1	305.40	14:19:12	27.058	-81.567	42.3	89.4	765
8	14:19:16	27.062	-81.572	42.2	89.4	306.10	14:22:47	27.275	-81.954	41.8	89.9	1314
9	14:23:31	27.301	-82.041	41.8	89.9	272.92	14:32:48	27.298	-83.261	40.8	90.4	3467
10	14:36:11	27.533	-83.283	40.1	90.8	88.02	14:41:50	27.533	-82.595	38.2	91.8	2116

NUMBER OF FILES FOR THIS FLIGHT = 10
 TOTAL NUMBER OF SCAN LINES = 20072
 DATE THESE FILES WERE PROCESSED = 14-Jun-99
 DATE THIS LIST WAS CREATED = 14-Jun-99
 GRANULE VERSION = 9

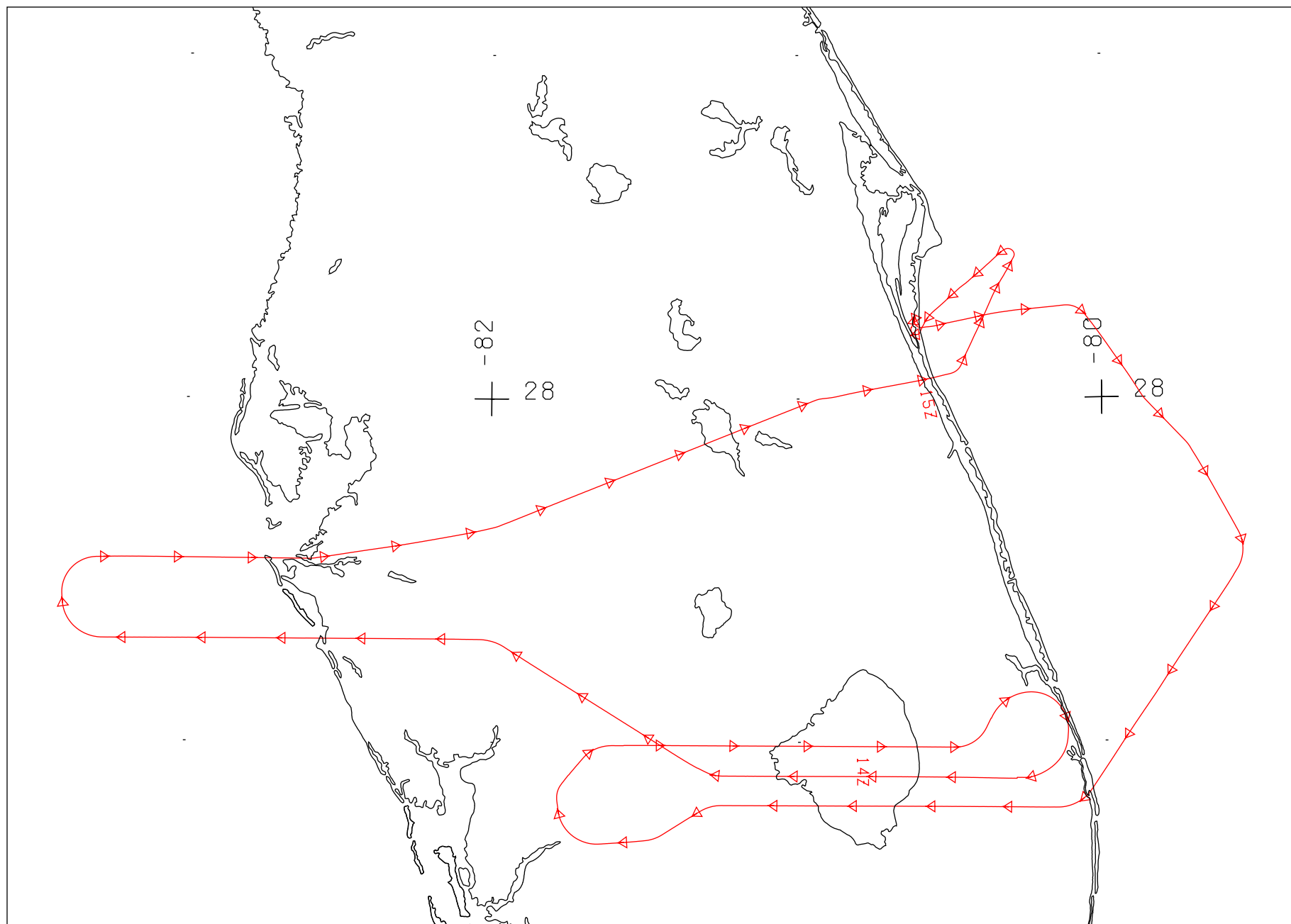
CAMERA FLIGHT LINE DATA

FLIGHT NO. 99-073

Accession # 05343

Sensor # 034

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	7971 - 7984	13:41:14	13:47:31	66000/20120	10-80% cumulus
C - D	7985 - 8000	13:56:25	14:03:37	68000/20730	10-80% cumulus frames 7985 - 7995; 10 - 40% cumulus frames 7998 - 8000
E - F	8001 - 8015	14:10:43	14:17:25	68000/20730	
G - H	8016 - 8025	14:26:10	14:30:27	66000/20120	
I - J	8026 - 8037	14:38:00	14:43:14	66000/20120	

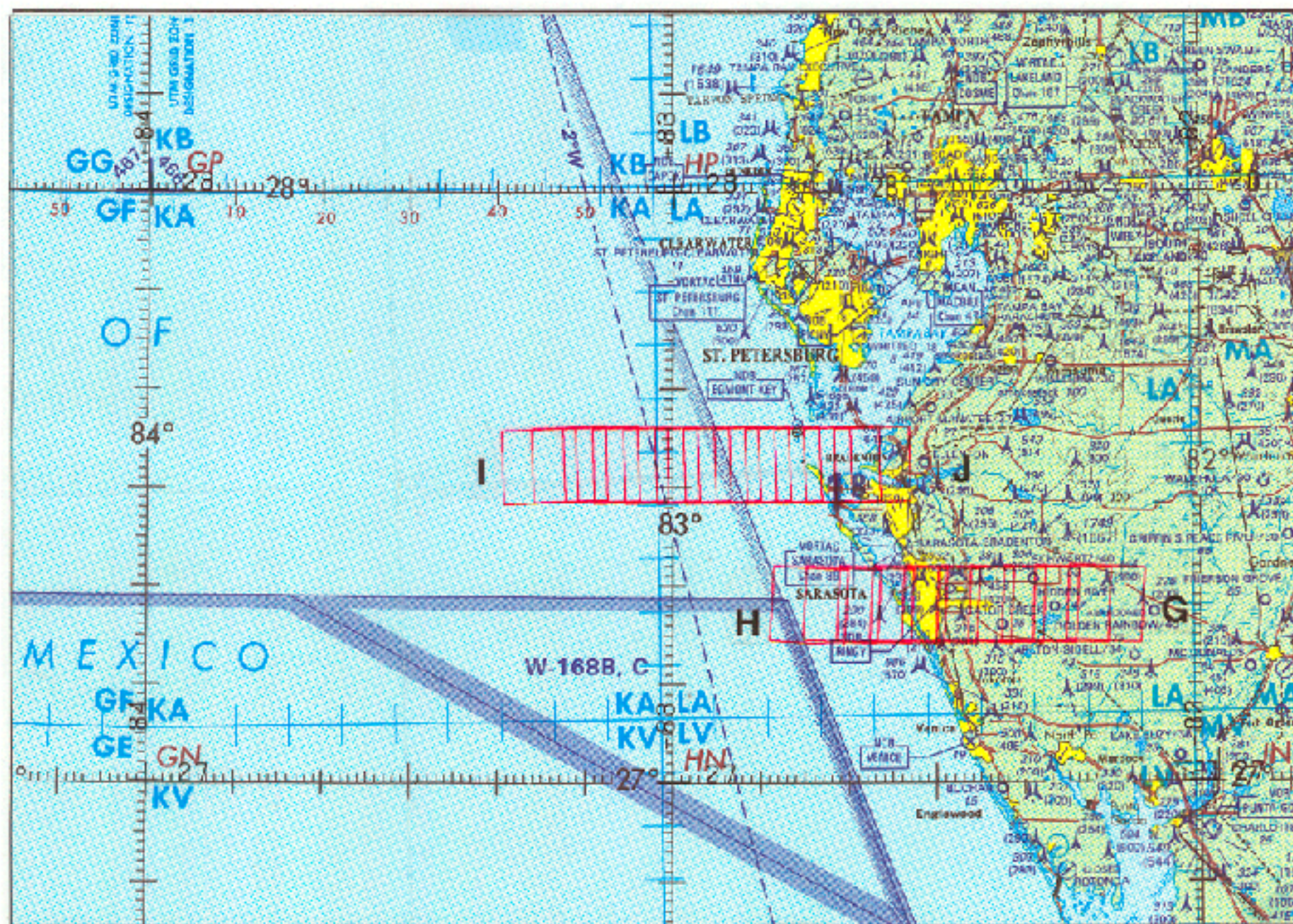


FLIGHT 99-074

21 MAY 1999

A/C 809

RC-10 / AVIRIS / MAS50



FLIGHT 99-C74

21 MAY 1999

A/C BOS

RC-10 / RVIRIS

ONC H-25

